REMARKS

Applicant respectfully requests the Examiner's reconsideration of the present application.

Summary of Office Action

Claims 1-20 are pending.

Claims 1-3, 5-7, 9-10, 12, 15-16, and 18 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,274,702 of Rosch, et al. ("Rosch") in view of Millman, et al., *Integrated Electronics: Analog and Digital Circuits and Systems*, "The CB Configuration", 1972, p. 254 ("Millman").

Claims 4, 8, 11, and 17 were rejected under 35 U.S.C. § 103 as being unpatentable over Rosch in view of Millman and further in view of Spanos, "University of California at Berkeley EE 105: Microelectronic Devices and Circuits" (Fall 1999) ("Spanos").

Claims 13, 14, 19, and 20 were indicated as being allowable if re-written.

Response to Examiner's response to arguments

The Examiner has based the rejections at least in part on observations discussed in a response at page 11 of the Final Office Action dated 01/14/2005. With respect to Rosch, the Examiner has stated:

> In particular, if one implemented the output buffers (132) and (134) with a common base transistor arrangement and inherent isolation would exist between all voltages on the subscriber line itself and the audio source due to transistor bias.

(01/14/2005 Final Office Action, p. 11)

Applicant respectfully submits that 1) this is clearly a hindsight argument based on applicant's disclosure; 2) the Examiner's characterization of such a modification to Rosch is incorrect; and 3) such a modification would render Rosch unworkable.

Since Rosch's amplifiers are d.c. unity gain amplifiers, the tip and ring voltages at the output of the d.c. amplifiers 132, 134 are the same as those

appearing on the inputs of amplifiers 132, 134. As noted by Rosch, "the d.c. voltage levels at their non-inverting inputs determine the d.c. voltage levels at their outputs and on the wires 36, and hence on the tip and ring wires T and R of the telephone line." (Rosch, col. 11, lines 33-39). Thus there cannot be isolation from the subscriber line d.c. voltage levels.

Applicant agrees that the Rosch's buffers also do not provide isolation from the d.c. current feed (142, 144, 148, and 150). In fact, Rosch's buffers do not provide any d.c. isolation whatsoever.

Applicant submits that the elements of Rosch that provides d.c. isolation between the subscriber line and the source of the audio signal (Rx feeding 104 to 128, 130) are in fact capacitors 136, 138. Given that Rosch's amplifiers 132, 134 are simply unity gain amplifiers providing the same voltage at the output as appears at their non-inverting inputs, the non-inverting inputs must be protected from any d.c. offset contributed by the audio signal. Rosch achieves this protection by capacitors 136, 138.

Response to 35 U.S.C. § 103 Rejections

Claims 1-20 were rejected under 35 U.S.C. § 103 as being unpatentable over various combinations of Rosch, Millman, and Spanos. Applicant respectfully submits the claims are patentable under 35 U.S.C. § 103 in view of the cited references.

In order to sustain a rejection under 35 U.S.C. § 103, three criteria must be met:

> *First*, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *Second*, there must be a reasonable expectation of success. *Finally*, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure

(*In re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991)(*emphasis added*)

Applicant submits that 1) there is no suggestion or motivation to modify or combine the references as proposed by the Examiner; 2) there is no expectation of success; and 3) the combination does not teach all claim limitations.

Characterization of references

Rosch was cited for disclosing a telephone line interface circuit that receives an outgoing audio signal from the central office on a receive line which is coupled to the subscriber line through amplifier circuits. Rosch includes a disclosure of a subscriber line interface circuit having a sense network (Rosch, Fig. 2) and a line drive circuit (Rosch, Fig. 3). The line drive circuit is coupled to the tip and ring wires of the telephone line via the sensing network. The sensing network senses the tip and ring lines to determine the subscriber line differential current (ID), loop current (IL), common mode voltage (VCM), and common mode current (ICM). A digital control circuit within the linefeed driver monitors the sensed IL, ICM, and VCM and adapts the line interface circuitry. (Rosch, col. 11, lines 7-16).

Millman was cited as teaching the use of common base transistor configurations to match a low impedance source to a high impedance load.

Spanos was cited as teaching the similarity between common base amplifiers and common gate amplifiers.

Lack of motivation to combine/modify

The Examiner has stated:

> Rosch contains all elements of the claim with the exception of coupling the audio signal to the subscriber line with transistors coupled in the common base configuration. Millman teaches that a transistor in common base configuration can be used in several applications, one of which is matching a low impedance source to a high impedance load. The circuit of figure 3 (Rosch) depicts amplifiers 132 and 134 connected to a low impedance sources superimposed with the receive path signal (i.e., audio signal) driving the tip and ring lines (i.e., high impedance load/subscriber line), respectively. It would have been obvious for one of ordinary skill in the art at the time of the invention to use a plurality of transistors, coupled in the common base configuration, for the line driving amplifiers to match a low impedance source to a high impedance load as taught by Millman.

(05/23/2005 Office Action, p. 3)

Applicant traverses the Examiner's assumptions and conclusions which are clearly contrived with hindsight of applicant's disclosure rather than any legitimate suggestion found in the references.

To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 USPQ 972 (BPAI 1985). There are several points of error in the Examiner's analysis. Moreover, applicant submits that the Examiner's line of reasoning is not supported by the references or even the present application.

There is no express or implicit teaching or suggestion within Millman or Rosch to combine them in the manner suggested by the Examiner. The portion of Millman relied upon by the Examiner actually states:

> The CB stage has few applications. It is sometimes used to match a very low impedance source, to drive a high impedance load, or as a noninverting amplifier with a voltage gain greater than unity.

(Millman, p. 254)

Millman, for example, has presented no indication as to what would qualify as a "high impedance load" or a "very low impedance source". Rosch does not address whether the source is low impedance or whether the subscriber equipment is high impedance.

Applicant submits that 1) the Examiner has not provided any support for the proposition that the circuitry presenting the inputs to Rosch's amplifiers 132, 134 has a low impedance; 2) the Examiner has not provided any support for the proposition that the subscriber equipment presents a high impedance load (when the audio signal would be present); and 3) Rosch clearly teaches away from amplifiers having a voltage gain substantially larger than unity - certainly not the gains indicated in Table 8-5 of Millman.

Applicant is unable to find any basis for the Examiner's assumption that Rosch's SLIC is a "very low impedance source". Rosch provides values on the

order of 320KΩ for resistors 140, 146 coupled to the non-inverting inputs of their respective unity gain amplifiers (Rosch, col. 11, lines 17-23; Fig. 3). Moreover, current sources 142, 144, 148, and 150 are high impedance sources. (Rosch, col. 12, lines 8-11). Thus applicant submits that Rosch does not teach or suggest a "very low impedance source" being provided as input to amplifiers 132, 134 of Rosch.

Applicant also submits that Rosch does not teach or suggest a "high impedance load". Subscriber equipment has an impedance that varies significantly depending upon whether it is on-hook or off-hook. Applicant submits that for audio-driving applications, the subscriber equipment load at issue is the off-hook load (i.e., when audio communications would be taking place over the subscriber line). Applicant submits that the off-hook impedance is typically much, much lower than the on-hook impedance and certainly would not qualify as a "high impedance load". Indeed judging from the scales used either for R_i or R_o of Millman's Table 8.5, applicant submits that typical off-hook subscriber equipment would be a low impedance load rather than a high impedance load.

Finally, Rosch is quite clear that amplifiers 132, 134 should be unity or at least not substantially greater than unity gain voltage amplifiers. (Rosch, col. 10, lines 18-38). Millman clearly indicates that the voltage gain of a common-base configuration is greater than unity and categorizes the gain as "high" (Millman, p. 254; Table 8-5).

Applicant submits that if one accepts Millman's indications of suitable applications for a common-base configuration, then contrary to the Examiner's assertions, Millman would imply using something *other* than a common-base configuration to drive the audio signals from a SLIC to the off-hook subscriber equipment.

Aside from examining the source and the load impedance, one might examine the expected impedances of the unity gain amplifiers 132, 134 of Rosch for comparison with a common-base configuration. Applicant submits that the unity gain amplifiers 132, 134 illustrated in Figure 3 of Rosch are typically

referred to as voltage followers by those skilled in the art. Applicant submits a voltage follower is characterized as having a high input impedance, a low output impedance, and unity gain. Referring to Millman's Table 8-5 the common-base configuration is characterized as having a low input impedance, a high output impedance, and gain considerably greater than unity. Thus the common-base configuration exhibits properties wholly inconsistent with the properties expected of a voltage follower.

The Examiner has stated conditions that would justify the use of a common-base configuration without any evidence that Rosch's subscriber equipment or SLIC meet the requisite conditions. Even with the hindsight of applicant's disclosure the Examiner cannot present a convincing line of reasoning *because the Examiner has not shown that any of the conditions suggested as motivating factors by Millman are present in Rosch. Apparently none of Millman's motivating factors are present in the Rosch reference. Moreover, the common-base configuration itself does not exhibit properties consistent with the properties required of voltage followers 132, 134.* As an aside, applicant further submits that the "modification" proposed by the Examiner does not appear to provide any advantages for Rosch thus begging the question as to the incentive or motivation for modifying Rosch.

Applicant respectfully submits that there is no motivation to combine the references as proposed by the Examiner and the references teach away from being combined in the manner suggested by the Examiner.

No reasonable expectation of success

The Examiner has proposed replacing Rosch's amplifiers 132, 134 with common-base configurations. Applicant submits that such modification would render Rosch's amplifiers unsuitable for their intended purpose and indeed would render Rosch's SLIC inoperable. Moreover, applicant submits that the situations expressed in Millman for the use of a common-base configuration amplifier appear to be wholly absent from Rosch. (Millman, p. 254)

> If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being

modified, then the teachings of the reference are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 123 USPQ 349 (CCPA 1959)

Rosch's amplifiers are unity gain d.c. voltage amplifiers. Applicant submits, however, that common-base configurations are less than unity current amplifiers and greater than unity voltage amplifiers as is well-known in the art and illustrated in Table 8-5 of Millman. Thus a common-base configuration does not replace the functionality provided by Rosch's amplifiers 132, 134 in either the voltage or current domain.

The amplifiers 132, 134 of Rosch's line drive circuit are used to drive the subscriber line. Amplifiers 132, 134 are unity gain, d.c. voltage amplifiers. (Rosch, col. 10, lines 18-29) Thus any d.c. being driven on the subscriber line *must appear* at the non-inverting inputs of amplifiers 132, 134 (Rosch, col. 11, lines 33-39). Clearly, Rosch's amplifiers do not provide d.c. isolation between their outputs and inputs. *Rosch's amplifiers are not permitted to provide d.c. isolation from the subscriber line because Rosch requires d.c. amplifiers of unity gain for the tip and ring input signals.*

Rosch's audio signal (RX) is a.c. coupled to the non-inverting input of amplifier(s) 132, 134. The d.c. isolation for the audio source is not provided by the amplifiers 132, 134. To the contrary, d.c. isolation for the source of the audio signal is provided by capacitors 136, 138. (e.g., 104, 106, see Rosch, col. 10, lines 4-9; Fig. 3).

Applicant respectfully submits that the Examiner is unable to match the functionality of Rosch's amplifiers 132, 134 using common-base configuration amplifiers. Rosch clearly teaches away from using any amplifier that would provide d.c. voltage isolation between its output (subscriber line) and input (tip and ring input signals). If common-base configuration amplifiers were used in such a way as to provide d.c. isolation between the output and the input of the amplifiers, Rosch's SLIC would be rendered inoperable since Rosch's amplifiers are required to be unity gain d.c. amplifiers for the tip and ring input signals.

Thus applicant submits that Rosch's amplifiers 132, 134 do not provide d.c. isolation from the subscriber line for the audio source and if they did, then they

would likewise provide d.c. isolation for the tip and ring input signals effectively rendering Rosch's SLIC inoperable or requiring further modification to Rosch which would entail changing the principle of operation.

Applicant therefore respectfully submits that one skilled in the art would not have any reasonable expectation of success. Indeed significant further modifications to Rosch would be required to enable Rosch to work with the modification proposed by the Examiner, if Rosch could be made to work at all.

Prior art references fail to teach or suggest all claim limitations

As noted above, modification of Rosch's amplifiers 132, 134 to a common-base configuration that provides d.c. isolation from the subscriber line would render Rosch's SLIC inoperable. Rosch relies on capacitors rather than the amplifiers to provide d.c. isolation for the source of the audio signal.

Applicant submits that the Examiner is unable to legitimately combine the prior art references in a manner that teaches or suggests *coupling an audio signal to a subscriber line through a plurality of transistors coupled in a common base configuration wherein the common base configuration provides d.c. isolation from the subscriber line for a source of the audio signal.*

In contrast, claims 1, 5, 9, and 15 include the language:

> 1. A method comprising the steps of:
>
> a) receiving an outgoing audio signal; and
>
> b) *coupling the audio signal to a subscriber line through a plurality of transistors coupled in a common base configuration, wherein the common base configuration provides d.c. isolation from the subscriber line for a source of the audio signal.*

(Claim 1)(*emphasis added*)

> 5. A method comprising the steps of:
>
> a) receiving linefeed driver control signals and outgoing audio signals on a same plurality of signal lines; and
>
> b) *providing the outgoing audio signals to a subscriber line through a common base isolation stage, wherein the common base isolation stage provides d.c. isolation for a source of the audio signals.*

(Claim 5)(*emphasis added*)

9. A subscriber line interface circuit apparatus, comprising:
a first circuit for coupling a received outgoing audio signal to a subscriber line, *wherein the first circuit couples the received outgoing audio signal to the subscriber line through a common base isolation stage, wherein the common base isolation stage provides d.c. isolation from the subscriber line for a source of the audio signal.*

(Claim 9)(*emphasis added*)

15. A subscriber line interface circuit apparatus, comprising:
a signal processor providing an outgoing audio signal; and
a linefeed driver coupled to receive the outgoing audio signal, wherein *the linefeed driver couples the received outgoing audio signal to a subscriber line through a common base isolation stage, wherein the common base isolation stage provides d.c. isolation from the subscriber line for the signal processor.*

(Claim 15)(*emphasis added*)

Thus applicant submits claims 1, 5, 9, and 15 are patentable over the cited references under 35 U.S.C. § 103. Given that claims 2-4 depend from claim 1; claims 6-8 depend from claim 6; claims 10-14 depend from claim 9; and claims 16-20 depend from claim 15; applicant submits claims 2-4, 6-8, 10-14, and 16-20 are likewise patentable over the cited references.

Applicant respectfully submits the rejections under 35 U.S.C. § 103 have been overcome.

Additional comments on Examiner's remarks with respect to rejection of claim 2

To the extend understood by applicant, the Examiner appears to have developed a rather contorted argument in order to allege that the feedback paths of the unity gain amplifiers 132, 134 are signal lines consisting of both the linefeed driver control signals and the outgoing audio signals. (05/23/2005 Office Action, pgs. 3-4). Applicant traverses the Examiner's characterization of the unity gain amplifier feedback paths as carrying the linefeed driver control signals and the outgoing audio signals.

Referring to Rosch, the outputs of line amplifiers 132, 134 is provided to their respective inverting inputs in order to ensure that amplifiers 132, 134 operate as noninverting, unity gain amplifers. Applicant submits that this is

consistent with characterization as a feedback signal rather than a control signal and that amplifiers 132, 134 are configured as voltage followers.

The inputs to amplifiers 132, 134 *are* the tip and ring signals rather than linefeed driver control signals due to the fact that amplifiers 132, 134 are unity gain voltage amplifiers. Applicant respectfully submits that if the Examiner's reasoning were applicable, then one could absurdly draw the conclusion that the tip and ring lines themselves are signal lines providing the linefeed driver control signals and the outgoing audio signal.

Applicant respectfully submits that Rosch's outgoing audio signal and linefeed driver control signals are not received on the same signal lines. Clearly, current sources 142, 144, 148, 150 are controlled by control lines 154, 162, 164, and 156 from digital control circuit 152 which forms part of the control circuitry 102. (Rosch, col. 10, lines 39-66). The current sources are controlled to steer the voltages presented to the input of unity gain amplifiers 132, 134 which in turn correspond to the tip and ring voltages of the subscriber line.

The outgoing audio signal, however, is not present on any control line for any of the current sources. The outgoing audio signal is superimposed upon the tip and ring signals generated by current sources 142, 144, 148, 150 at the noninverting input to amplifiers 132, 134 in response to the linefeed driver control signals present on 154, 162, 164, and 156. (Rosch, col. 11, lines 24-58; Fig. 3). Rosch's outgoing audio signal is thus superimposed upon the tip and ring signals, but not on the linefeed driver control signals 154, 162, 164, 156 generating the tip and ring signals.

Conclusion

In view of the arguments presented above, applicant respectfully submits the applicable rejections have been overcome. Therefore all of claims 1-20 should be found to be in condition for allowance.

If there are any issues that can be resolved by telephone conference, the Examiner is respectfully requested to contact the undersigned at **(512) 858-9910**.

Respectfully submitted,

Date November 23, 2005 William D. Davis

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